Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 15 of the	)	ET Docket No. 96-8
Commission's Rules Regarding Spread	)	RM-8435, RM-8608, RM-8609
Spectrum Transmitters	)	

COMMENTS OF ITRON, INC.

Itron, Inc. (Itron) submits these comments in response to the Notice of Proposed Rulemaking (NPRM) in the above-referenced proceeding. Itron is the world leader in RF-based automatic meter reading systems used by gas, electric, and water utility companies. To date, more than six million meter reading devices have been placed into operation. The meter transponders used by Itron systems, which transmit in the 902-928 MHz band, operate under Part 15 of the Commission's rules.

Itron is a member of the Part 15 Coalition (the Coalition), which also is filing comments in this proceeding. Itron supports the Coalition's comments, which address all of the major issues in the NPRM. Itron's comments speak more directly to one of the issues raised in the NPRM — the use of short duration transmissions under Section 15.247.[1] In the NPRM, the Commission has specifically asked for suggested alternative approaches to the existing regulations that would facilitate the operation of short duration transmission systems under the spread spectrum frequency hopping regulations. These comments provide such an alternative approach based on a combination of straight-forward changes to the existing Section 15.247 rules and the rule changes proposed in the NPRM.

DISCUSSION

I. The Technical Characteristics Of Itron's Current System.

Itron's meter-reading system is a short duration transmission system employing meter radio modules that operate under Sections 15.231 and 15.249 of the Commission's rules. The system architecture is fairly simple.

[1] See NPRM ¶¶ 39-40.

A DataCommand® Unit (DCU) reader is installed in each mobile unit equipped to read meters using the Itron system. The DCU transmits a wake-up signal to the utility meter radios as the mobile unit drives through instrumented neighborhoods. The DCU is licensed under the Part 94 Multiple Address System rules, transmitting a low frequency AM tone (typically 32 Hz) on a carrier in the 952-956 MHz band. Following the wake-up signal, each meter within range of the DCU transmits its consumptive reading (e.g., ft^3 of gas or kWh of electricity). The DCU is configured with 48 parallel receivers spaced 200 kHz on center across the 910-920 MHz band, each with an IF bandwidth of 280 kHz. All meter radio transmissions are listened to by the DCU.

The system uses a frequency hopping architecture for meter replies. Eight identical messages, each on a different frequency, are transmitted each time that the meter sends its reading. Each transmitter typically spreads the eight messages over 4 MHz, with the aggregate of all radio transmissions spread between 910 MHz and 920 MHz. Although only eight messages are transmitted for each burst, a circular list containing a total of 31 pseudo-random frequencies is used. Each message has a 20 dB bandwidth of approximately 500 kHz and is 6 ms long with 100 ms between messages. As long as the wake-up signal is present, the meter radio transmits a burst of eight messages every 11 seconds. Given that all metering information is transmitted in each 6 ms message, and that the meter radios only transmit when interrogated, the Itron system is characterized by extremely short duration messages with low duty-cycle.

Although Itron's meter reading systems have been an extremely efficient method of data collection for several types of metered services, increasing use of the 902-928 MHz band may require more flexibility in Itron's meter-reading system. Thus, while Itron fully supports the course that the Commission has charted in its proposal to reduce the number of hopping channels from 50 to 25 as an option for Section 15.247 systems operating in the 902-928 MHz band, requiring that these systems have a minimum channel bandwidth of 250 kHz and a maximum transmit power of 500 mW,[2] it offers further suggestions for improving the Commission's rules pertaining to short-duration transmission radio technologies.

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[2] See id. ¶¶ 26-33.

Mindful of the large number of transmitters that it was deploying in the band, Itron designed the meter radio portion of its system to maximize spectrum sharing in the 902-928 MHz band by minimizing the transmissions necessary to communicate with the mobile unit transceivers. Although it would be theoretically possible for Itron to use higher power output by redesigning its system in accordance with Section 15.247, this solution is not in the public interest for three reasons.

First, employing Section 15.247 spread spectrum transmission, as modified by the NPRM, would be a grossly inefficient use of the spectrum. Itron presently installs several million transmitters every year; if each of these transmitters was required to transmit 25 messages instead of the 8 messages that are currently transmitted for each meter reading, and the transmissions were required to use a minimum of 6.25 MHz bandwidth instead of the current 4 MHz, the result would be further congestion of the 902-928 MHz band. Furthermore, Itron has no need to operate at power levels even approaching 500 mW so the Commission should not give it the incentive to do so. Nothing would be served by this unnecessary propagation of RF energy, especially in the very crowded 902-928 MHz band.

Second, the requirement to formally synchronize hops between the transmitter and receiver would further increase the RF emissions of the meter radio. For short duration, low duty-cycle systems such as Itron's, these characteristics should be recognized for their inherent interference reducing value.

Third, the requirements to transmit a minimum of 25 messages and to include a hopping synchronization process would unnecessarily reduce the battery life of meter radios fitted to gas and water meters, regardless of whether they are Itron's or another vendor's. Automated meter-reading devices currently are available at a cost that makes their use a distinct cost saver to utilities over human meter readers. They must operate with a very small battery and a very long battery life, to reduce both initial and maintenance costs.

To minimize the increase in RF emissions and spectrum usage by its radios, Itron proposes in these comments that the Commission adopt an alternative approach to allow maximum flexibility under the spread spectrum rules, while preserving the essential interference avoidance and immunity of spread spectrum transmission. This alternative approach, set forth below, would allow short duration transmission systems to operate without formal hopping synchronization

requirements and with fewer than 25 channels per transmit burst, provided that these systems truly operate as spread spectrum systems. This approach, therefore, would allow Itron, and others, to continue to offer high-performance wireless solutions using short duration transmission radios in the increasingly congested 902-928 MHz band without adversely affecting other spectrum users.

II. Itron's Proposed Modification To Section 15.247.

The Commission has proposed to allow frequency hopping spread spectrum systems operating in the 902-928 MHz band to use as few as 25 hopping channels. By reducing the number of hopping channels required of frequency hopping systems, the Commission hopes to reduce the spectral occupancy of Part 15 frequency hopping devices and thereby maximize spectrum efficiency in the increasingly congested 902-928 MHz band. Itron agrees with the purpose and intent of this proposed rule change. Itron urges, however, that the Commission go further to permit systems with low duty-cycles to share spectrum more effectively in this band.

Spread spectrum transmission increases the ability of a system to withstand interference from other systems and reduces the potential interference to those other systems. Short duration (low duty-cycle) systems exhibit these same characteristics by their very nature. Further improvements in the Section 15.247 spread spectrum rules may be realized by eliminating the requirement for transmitter/receiver hopping channel synchronization for short duration systems, where the primary result of forced synchronization is additional RF emissions with no actual increase in information content of the communication session. Itron proposes that this classification boundary be aligned with the maximum hopping channel occupancy time allowed under Section 15.247 of 400 ms. If more than 400 ms is required to transmit all information, a hop to another channel and formal synchronization should be required.

Without synchronization, short duration systems operating in accordance with Itron's proposed rule modification would be required to use alternative strategies to receive transmitted information. The Itron system, for instance, uses a bank of parallel receivers constantly listening for meter radio transmissions. Although no synchronous hopping process is used, Itron submits that the use of parallel receivers fully meets the spirit of spread spectrum operation in that the transmit and receive bandwidths are similar and an attempt is made to receive all

messages that are transmitted. Itron proposes that the use of parallel receiver architectures, or any other design which ensures that any message sent is utilized at the receiver to contribute to the overall processing gain of the system, should be deemed to be an adequate substitute for synchronized hopping.

The existing rule of separating hopping channels by at least the 20 dB bandwidth of the hopping channel, combined with the NPRM proposal (assuming that it is adopted) to allow 25-channel systems, is effective for ensuring that RF energy is adequately spread over the band, thus maintaining the spread spectrum characteristics and sharing integrity of the band. For short duration systems, however, this can result in excess emissions when complying with the 25 channel requirement.

Itron proposes, therefore, that there be no minimum requirement on the number of frequency hops during any one transmission sequence, provided that there is a minimum of 25 or 50 (depending on which configuration option is chosen) total hopping frequencies in the system, the minimum channel spacing requirements are maintained, and the transmitter utilizes all frequencies in pseudo-random sequence uniformly over time. These constraints maintain the concept of processing gain for frequency hopping systems, which is determined by the number of hopping channels.

For example, the Itron system sends eight identical messages per transmission sequence, corresponding to a meter read request. With a 20 dB channel bandwidth of 500 kHz, the 25 channel option is chosen with a total bandwidth for all transmissions of 12.5 MHz. In this configuration, with eight messages per read, it would take four meter read requests to use all of the 25 channels. In addition, there could be a period of weeks between each read. This long time between reads further illustrates the lack of value of synchronized hopping for these short duration transmissions and it illustrates the inherent spectrum sharing qualities of the Itron system, owing to its low duty-cycles.

The proposals presented above effectively address the inclusion of short duration transmissions into Section 15.247, with full respect for devices already operating under the current rules and with full regard for the fundamental principles of spread spectrum operation — the ability of the system to withstand interference from other systems and the minimization of potential interference to

other systems. Further, the inherent spectral efficiency of short duration signals is recognized. These proposed rule changes, if adopted, will allow system designers additional flexibility to develop spread spectrum systems with no degradation of the fundamental sharing principles of the 902-928 MHz band.

Respectfully submitted,

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